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ABSTRACT

Three experiments were conducted to examine the effects of providing extrinsic rewards for engaging in an activity on children's subsequent intrinsic interest in that activity. In each study, preschool children were asked to engage in an activity of initial intrinsic interest in individual experimental sessions. The children agreed to engage in this target activity under three different reward conditions. After these sessions, unobtrusive measures of the children's subsequent intrinsic interest were obtained during a series of free-play periods. In each of the studies, results indicated that asking children to engage in an activity of initial interest as a means to some ulterior end proved a consistently effective method for undermining these children's intrinsic interest in that activity. In addition, the results indicated that close adult surveillance also produced a similar decrement in subsequent intrinsic interest. Suggestions to maintain children's intrinsic motivation included: 1) systems of extrinsic reward systems should be employed only when nesessary to elicit the desired behavior pattern; and 2) when necessary, such programs should attempt to employ the least powerful rewards when required to produce the desired behavior change. (Author/KSM)

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EXTRINSIC REWARDS AND INTRINSIC MOTIVATION IN CHILDREN

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SUMMARY

Three experiments were conducted to examine the effects of providing extrinsic rewards for engaging in an activity on children's subsequent intrinsic interest in that activity. In each study, preschool children were asked to engage in an activity of initial intrinsic interest, in individual experimental sessions. In the Expected Reward conditions, the children agreed to engage in this target activity in order to obtain an extrinsic reward; in the Unexpected Reward conditions, the children agreed to engage in the activity without knowledge of the reward but were subsequently given the same reward and the same feedback; and in the No Reward conditions, the children neither expected nor received a reward. One to three weeks after these individual sessions, unobtrusive measures of the children's subsequent intrinsic interest in these activities were obtained in the children's classrooms during a series of free-play periods. In each of the studies, the results indicated that expectation and receipt of an extrinsic reward for engaging in an initially interesting activity, relative to the other two conditions, produced a marked decrease in subsequent intrinsic interest in that activity in the classroom situation where no extrinsic rewards were expected. In short, asking children to engage in an activity of initial interest as a means to some ulterior end proved a consistently effective method for undermining these children's intrinsic interest in that activity. Moreover, across the three experiments, these results proved robust over a wide range of specific activities, rewards, and procedures. The results of the final experiment indicated, in addition, that close adult surveillance during the experimental sessions when the child was engaged in the activity also produced a similar decrement in subsequent intrinsic interest in the activity, independent of the effects of expected rewards. From these studies, it was suggested that to maintain children's intrinsic motivation (1) systems of extrinsic reward systems should be employed only when necessary to elicit the desired behavior pattern and (2) when necessary, such programs should attempt to employ the least powerful rewards required to produce the desired behavior change.

INTRODUCTION

The practice of providing children with explicit extrinsic rewards in order to maintain or enhance their interest in an activity is characteristic of our current educational system. Yet despite the overwhelming evidence that such rewards can effectively increase the interest a child will show in an activity in the situation in which these rewards are administered, (O'Leary & Drabman, 1971) little attention has been paid to the effects of such rewards on a child's intrinsic interest in the activity -- interest manifested in other situations in the absence of any anticipation of external reward. More generally, although the possible effects and appropriateness of tangible rewards in classrooms has recently been a topic of considerable discussion (Brophy, 1972; Good, 1972; O'Leary, Poulos, & Devine, 1972), little empirical data exists on the indirect consequences of such reward systems.

Recently, however, Lepper, Greene, and Nisbett (1973) have demonstrated that at least under certain conditions the provision of extrinsic rewards for engaging in an activity may actually undermine a child's intrinsic interest in that activity — a finding of potentially broad significance. Theoretically, this research derives from the perspective of self-perception or attribution theory (Bem, 1967, 1972; Kelly, 1967, 1973), which suggests that, under certain conditions, there will be a negative relationship between the amount of visible extrinsic reinforcement offered a person to induce him to engage in an activity and that person's subsequent evaluation of and intrinsic interest in the activity. The present studies seek to examine further the implications of this perspective for current educational practices.

In brief, self-perception theory proposes that a person's interest in and attitudes towards an activity or object will often be determined, in part, by that person's perception of his own previous behavior with respect to that activity and the conditions apparently controlling that previous behavior. Just as a person will attribute to another an intrinsic interest in an activity precisely to the extent that the person does not perceive salient, unambiguous, and sufficient extrinsic contingencies to which the other's behavior may be attributed, the theory proposes, a person will similarly infer his own motives from his own prior actions and the circumstances surrounding them. To the extent that the external reinforcement contingencies controlling his behavior are salient, unambiguous, and sufficient to "explain" his actions, the person will attribute his behavior to these salient controlling circumstances; but to the extent that these contingencies are unclear, invisible, and psychologically insufficient to account for his actions, the person will attribute his behavior to his own dispositions, interests and desires.

With this self-perception theory, it is possible to account for a variety of phenomena, including the large dissonance literature on the effects of "insufficient justification" (cf. Aronson, 1966). In these studies, subjects are induced to engage in unpleasant or inconsistent behavior under conditions of either clearly sufficient or psychologically insufficient external justification for the behavior; and the typical dissonance result is that subjects given low extrinsic justification for the behavior they have been induced to undertake come to believe that their actions were intrinsically motivated. In a self-perception analysis, then, this outcome is the result of a self-directed inference process -- in the

low justification conditions, the subject infers from his behavior and the lack of apparent external pressure that he must have wished to behave as he did; while in the high justification conditions, the subject infers his behavior was determined by the external pressures in the situation.

Besides its application to many classic dissonance paradigms, however, self-perception theory has a number of unique implications, perhaps the most intriguing of which could be termed the "overjustification" hypothesis — the proposition that a person's intrinsic interest in an activity may be undermined by inducing him to engage in that activity as an explicit means to some extrinsic goal (Lepper, Greene, Nisbett, 1973; Nisbett & Valins, 1971; Bem, 1972). If the external justification provided to induce a person to engage in an activity is unnecessarily high and pshychologically "oversufficient", the person should come to infer that his actions were basically motivated by the external contingencies of the situation, rather than by any intrinsic interest in the activity itself. In short, a person induced to undertake an activity of some initial interest as a means to some ulterior end should cease to see the activity as an end in itself.

Strong empirical support for such a proposition comes from a recent study by Lepper, Greene, & Nisbett (1973) who attempted an explicit test of the overjustification hypothesis in a natural preschool setting. In this study, a novel activity — the opportunity to draw freely with multicolored "magic marker" pens — was introduced into children's nursery school classrooms over a period of several days during "free play" periods, and unobtrusive measures of the children's initial intrinsic interest in this activity were recorded by observers behind a one-way mirror along one wall of the classroom. Children showing an initial interest in the activity were then selected as subjects, blocked by initial interest in the activity, and randomly assigned to one of three treatment conditions. In the Expected Award condition, subjects were asked to engage in the target activity in order to obtain an extrinsic reward — a "Good Player" certificate; in the Unexpected Award condition, subjects engaged in the same activity and received the same reward, but had no knowledge of the reward until after they had finished with the activity; and in the No Award condition, subjects neither expected nor received the reward, but otherwise duplicated the experience of subjects in the other conditions. These experimental treatments were administered by an experimenter not associated with the classroom and took place in an experimental room apart from the classroom. One to two weeks after these experimental sessions the target materials were again placed out in the children's classrooms for several days and unobtrusive measures of the children's post-experimental interest in the activity were recorded, as before.

From a self-perception perspective, it was predicted that subjects in the Expected Award condition would show less subsequent intrinsic interest in the activity than subjects in either the Unexpected Award or No Award conditions; and the results strongly supported this prediction. Subjects who had agreed to engage in the activity in order to obtain the award spent significantly less time playing with the materials during the post-experimental sessions than did subjects who received the same award but had not expected it and subjects who had received no award. Indeed, relative to the uniform baseline behavior of the three conditions, subjects in the Expected Award condition showed a significant decrease in interest in the activity, while subjects in the No Award condition showed no change in interest, and subjects in the Unexpected Award condition showed some evidence of an

increase in subsequent interest (although this trend was significant only for subjects below the median in baseline interest).

Further data also consistent with the overjustification hypothesis have been obtained by Deci (1971, 1972) in a radically different paradigm. In this study college students were asked to engage in a task — geometric "Soma" puzzles — of high initial intrinsic interest in an experiment ostensibly concerned with problem-solving skills. Each subject was given four puzzles to solve with ten minutes to work on each, and the puzzles were chosen to be soluble by virtually all subjects. One group of subjects was offered $1.00 for each puzzle they completed; a second group neither expected nor received monetary rewards. After the subject had solved the four puzzles, the experimenter excused himself from the room, indicating he would be gone for the next ten minutes and leaving the subject alone. On the table in front of the subject were a selection of current magazines and two additional puzzles the subject had not attempted, and the subject was told that he could do whatever he wished until the experimenter returned. During this time the subject's behavior was recorded unobtrusively from behind a one-way mirror to provide a measure of post-experimental intrinsic interest in the puzzles. With this paradigm, Deci predicted, and found, that subjects who had been previously paid to solve the puzzles spent less time playing with the puzzles during this free-choice period, in the absence of extrinsic rewards, than subjects who had not been previously paid.

Taken together, these studies provide experimental support for the proposition that, under certain conditions, a person's intrinsic interest in an activity may be undermined by asking him to undertake the activity as a means to some ulterior goal. Potentially, such findings have considerable implications for our understanding of the effects of reward systems on children in educational and clinical settings. The experiments presented in the report seek to examine further some of these implications.

EXPERIMENT I

From a self-perception perspective, the Expected Award manipulation employed by Lepper, Greene and Nisbett (1973) consisted merely of the presentation of the drawing activity in a means-end relationship to a symbolic reward, not unlike those routinely employed in classrooms. This rather limited manipulation, however, was sufficient to produce not only a significant decrement in the quality of pictures drawn during experimental sessions, but also a substantial loss in subsequent interest in the drawing materials themselves, measured unobtrusively in a classroom setting, one to two weeks later. Because these findings would seem to have potentially broad implications for many common classroom practices, it seems especially important to ask whether the situation which produced this "overjustification" effect was essentially similar to, or, perhaps, critically different from the types of situations to which one might wish to generalize from the results of the Lepper et al. (1973) study.

One potentially important ambiguity in the original study concerns the performance demands which subjects in the Expected Award condition perceived the experimenter to be making in determining whether the subject would receive an Award. Since subjects were told that the experimenter had "a few" Good Player Awards to be given to children who would help him out "by drawing some pictures for him", considerable latitude remained for interpretation by children on the basis of whatever expectations they brought with them to the experimental room. On the one hand, subjects may have perceived the experimenter as imposing a high demand for performance as a condition for being given a reward; on the other hand, subjects may have perceived little or no demand for performance implicit in the experimenter's words.

In real-world classrooms rewards seem to be related to activities in an almost unlimited number of ways. The effect of the Expected Award manipulations in the Lepper et al. (1973) study may, for example, have depended upon the subjects' percpetion of a high demand for performance. If so, its relevance would be limited to those classroom situations in which "only the best" students will be rewarded for their performance. Many or most subjects in the Expected Award condition, in this case, may reasonably have had a fairly low subjective probability of being rewarded. If this were true, their "loss of intrinsic interest" may have been simply the result of their feelings of "evaluation apprehension" (Rosenberg, 1969), rather than a self-perception effect.

On the other hand, the effect may have depended on precisely the opposite interpretation of the manipulation, namely, that little or no demand for performance was being made. If this were the case, there would be many classroom situations to which such a finding would have little or no relevance. Subjects in the Expected Award condition, by this reasoning, must have been fairly certain that they would receive a reward; this high subjective probability of being rewarded, in turn, may have increased the incentive value of the drawing activity for them, such that a later opportunity to engage in the activity, in the absence of the expectation of being rewarded for it, would have less incentive value by contrast (Bandura, 1971) with the former experience.

In addition, it is possible that the "overjustification" effect may have depended upon precisely the ambiguity present in the Lepper et al. (1973) study, or that the process underlying the effect was operating differently for different individuals in the study. If either of these qualifications were appropriate, it would be even more difficult to know how to generalize from that study to other situations.

For these reasons, Experiment I was designed both to replicate and to clarify the results of the original Lepper et al. (1973) study, varying orthogonally the expectation of an extrinsic reward and the explicit performance demand imposed upon the child. Specifically, half the subjects within both the Expected and Unexpected Award conditions were told that everyone in the nursery school who wished to draw pictures with the materials would receive an Award (Low Performance Demand), while the remaining subjects were told that only the two or three most outstanding artists in the entire school would receive an Award for their drawings (High Performance Demand). The study, therefore, involved a 2x2 (Expected vs. Unexpected Award x High vs. Low Performance Demand) factorial design, with subjects in a fifth, No Award cell serving as control subjects for comparison.

It was predicted that an "overjustification" effect in only the Expected-High Performance cells would lend support to the "evaluation apprehension" interpretation; an effect in only the Expected-Low Performance cells would support the "contrast" explanation; and an effect in neither of these cells would suggest that the Lepper et al. findings had been dependent upon the ambiguity in the original procedure. An "overjustification" effect in both Expected Award cells, however, would provide impressive evidence of the generality of the effect, as well as persuasive support for the self-perception interpretation of this effect.

METHOD

Subjects, Materials, and Experimental Setting.

The subjects for this study were 73 preschool children, ranging in age from 3-8 to 4-9, selected from the student population at the Bing Nursery School, located on the Stanford University campus. In general, these children came from predominantly white, middle-class backgrounds, and the sample included 37 males and 36 females.

The Bing Nursery School and its associated research facilities served as the experimental setting for this study. The nursery school consists of three classrooms which conduct similar and simultaneous, but independent programs. Two of the three classrooms are equipped with large one-way mirrors and sound equipment for observational purposes and were used in the study. Classes typically consist of approximately thirty children with an adult staff of four or five teachers. The program is, by intention, relatively unstructured, with considerable "free play" time in which the children are allowed to choose from among a variety of both continuously and periodically available activities. For the purposes of this experiment, this arrangement allowed the introduction of a novel experimental activity into the ongoing nursery school program by the nursery school teachers, without intrusion into the classroom by researchers, in a situation where children's responses to this activity could be unobtrusively observed and recorded.

The experimental materials were identical to those employed by Lepper et al. (1973). The opportunity to draw freely with felt-tipped magic markers served as the experimental activity and a "Good Player Award" -- a colored 3x5 card with words "Good Player Award" and spaces for the child's name and school engraved on the front, next to a large gold star and a red ribbon -- served as the extrinsic reward.

Experimental Sessions.

For the experimental sessions, each child was brought individually to one of the research rooms attached to the nursery school by a first experimenter, who introduced the task and delivered the manipulation of Expectation of Award. As the child entered the room, he was seated at a child-sized table containing a set of magic markers, a sheaf of white artists' drawing paper, and, in a folder concealed from the subject's view, a sample Good Player Award.

Presenting the drawing materials to the subject, the first experimenter indicated to all subjects that there was another man (or lady) at the nursery school who was very interested in seeing what sort of pictures children would draw with the magic markers. Then, following this introduction, for subjects in the Unexpected Award and the No Award groups, the experimenter asked the child simply if he would like to draw some pictures for this second experimenter.

For subjects in the Expected Award conditions, however, the experimenter first produced the sample Good Player Award, showed the subject how his name and school could be written on the Award, and indicated that the second experimenter had brought along a lot (or a few) of these Good Player Awards to give to the children who help him out by drawing some pictures (or who make the best drawings for him). For subjects in the Low Performance Demand group, the experimenter added that this second experimenter had "a whole lot of these Awards, enought for everybody in the nursery school who wanted to draw pictures so that all you have to do to win an Award is to draw some pictures with the magic markers"; for subjects in the High Performance Demand group, the experimenter added that this second experimenter had "only a couple of these Awards for the whole nursery school" and that "only the children who draw the very best pictures will win one, so you will really have to draw very good pictures with the magic markers to win an Award". Then, following this explanation, the child was asked if he would like to try to win an Award. After subjects had indicated assent, the second experimenter entered the room and the first experimenter excused himself, leaving the subject alone with the second experimenter.

The second experimenter sat down across the table from the subject, started a stopwatch, and asked the subject, "What would you like to draw first?" Most of the time the subject began to draw a picture immediately; when he didn't, a little coaxing was always sufficient to get him started. During the session, the experimenter was friendly, but not overly responsive to the subject. Generally, he attempted to show interest in, rather than explicit approval of, the subject's performance. Each subject was allowed six minutes to draw pictures and ratings of these drawings along qualitative dimensions were made by judges blind to the subject's condition.

The second experimenter remained completely blind to the subject's condition for the first five minutes of the session. After five minutes, he or she casually looked inside a manila folder which had been left on the table by the first experimenter to determine whether the subject was to receive an award or not, and if so, whether the subject was in the High or Low Performance Demand Condition. One minute later, the experimenter indicated to the subject that time was up and thanked all subjects, indicating, "You really have been a big help to me by drawing these nice pictures. You really did a very good job". At this point, subjects in the No Award control group were returned to their classroom; while the subjects in the remaining groups received their Award.

For those subjects who were to receive an Award, the second experimenter continued, "In fact, you have been such a big help to me and have done such a good job, that I have something special to give you. I'm going to give you one of my Good Player Awards, with your name and school on it." The second experimenter then produced a blank Award and wrote the subject's name and school on it. In the Low Performance Demand conditions, the experimenter added, "I have a lot of these Awards, and I'm giving them to all the children at the school who have helped me out by drawing pictures with the magic markers"; while in the High Performance Demand conditions, the experimenter added, "I only have a couple of these Awards for the whole nursery school, so I'm only giving them to the children who draw the very best pictures in the whole school with the magic markers."

When the experimenter had finished, he rose and asked the child to bring his Award to the corner of the room where the experimenter pulled back a standing slat screen which had been covering a large "Honor Roll" bulletin board, containing a standard array of either two (High Performance Demand) or ten (Low Performance Demand) other Good Player Awards. The child was then asked to place his Award on the honor roll board, and the experimenter noted how nice his award looked, indicated again what a very good job the child had done, and returned the subject to his classroom.

Classroom Observations.

One to two weeks after the completion of these individual experimental sessions, the primary measure of subsequent intrinsic interest in the activity, in the absence of an expectation of extrinsic reward, was taken in the subjects' classrooms following the procedure established by Lepper et al. (1973). For the first hour of three consecutive class sessions, the experimental activity was set out by the classroom teachers, among the periodic activities chosen by the teachers for each day, at a table near the door to the classroom. To increase the accuracy of the measures, the teachers were asked to render inaccessible other similar playing materials during the time the materials were available, and were asked not to sit at the target tables. Otherwise the teachers behaved in a normal fashion. Hence, when the materials were presented, the children were free to choose between the target activity and the variety of other activities offered by the nursery school.

Throughout this period, two observers, each blind to the subjects' experimental conditions and each equipped with an 8-track Rustrak continuous multiple event recorder, were stationed behind a one-way mirror along the wall of the classroom near the table containg the experimental materials. From this vantage point, these observers were able to record with near-perfect reliability ($r = .99$) the total amount of time spent at the target table for each of the children in the classroom.

RESULTS

Data were collected on both subsequent classroom play with the target activity and on children's drawings made during the experimental sessions. Two subjects who participated in the experimental sessions were absent from school during the entire data collection period; the drawings of two other subjects were lost before they could be rated. Available data from these four subjects were utilized where possible. Preliminary analyses by sex of child revealed no significant interaction with experimental condition; therefore, the data were collapsed across this dimension for further analyses.

The Classroom Measure: Subsequent Intrinsic Interest.

The effect of the experimental manipulations on intrinsic interest is shown in Table 1, where it is evident that subjects in the Expected Award cells subsequently played less often with the target activity in their classrooms than did subjects in the other cells. A log transformation ($Y' = \ln (Y+1)$) was performed on the percentage of time data to produce homogenous treatment variances (Winer, 1971, p.400). These transformed data were submitted to a 2x2 least-squared analysis of variance, with quite clear results.

First, the Lepper et al. (1973) findings were replicated. Subjects in the Expected Award conditions showed significantly less subsequent interest in the activity than subjects in the Unexpected Award conditions ($F_{1,52} = 5.66$, $p < .025$); in addition, subjects in the Expected Award cells showed less intrinsic interest in the target materials than did subjects in the No Award cell ($t = 2.03$, $p < .05$)[1], which, in turn, did not differ from the Unexpected Award cells ($t < 1$). Indeed, only 55% of the subjects in the Expected Award groups showed any interest at all in the activity during the post-experimental classroom observations, compared with 86% of the subjects in the Unexpected Award and No Award groups ($X^2 = 8.16$, $p < .01$).

Second, no support was found for any interpretation of the overjustification effect which would predict differences in subsequent interest in the target activity as a result of the Performance Demand manipulation. The analysis of variance yielded neither a main effect of Performance Demand, nor any interaction of Performance Demand with the Expected-Unexpected dimension (both F's < 1).

The Experimental Room Measures.

As in the Lepper et al. (1973) study, those differences in children's performance during the experimental sessions closely paralleled differences their subsequent intrinsic interest. Thus, the Performance Demand manipulation produced no significant effects on either the quantity or quality of children's drawings in the experimental room; accordingly, the data were collapsed over this dimension for further analyses. The remaining comparison of interest is between the subjects who expected a reward and those who did not. Table 2 presents this comparison and provides a summary of the data concerning the children's performance during experimental sessions.

First, the pictures of subjects who expected an award were rated significantly lower in average quality ($t = 2.29$, $p < .03$) than the pictures of subjects who had

Table 1

Transformed Percentage of Classroom Time Spent with the Target Activity, by Treatment Condition, Experiment 1.

Reward Expectancy	Performance Demand Imposed	
	High Demand	Low Demand
Expected Award	1.26	1.14
Unexpected Award	1.91	2.08
No Award Control	1.85	

no knowledge of the reward. Thus, a detrimental effect of the Expected Award manipulation was apparent during experimental sessions as well as later in the classroom setting, as in the Lepper et al. (1973) study. This finding is also consistent with results reported by Kruglanski, Friedman, and Zeevi (1971), in which both ratings of enjoyment and measures of quality of performance were negatively affected by a manipulation designed to produce attributions of subjects' motivations to extrinsic incentives.

Second, subjects who expected a reward drew somewhat more pictures than subjects who did not. This difference very nearly approached an acceptable level of significance ($t = 1.95$, $p < .06$) in the present study, which had not been the case in the Lepper et al. (1973) study. Not surprisingly, across conditions, the quantity and quality of pictures drawn by subjects in the experimental sessions were negatively correlated ($r = -.43$, $p < .01$). Number of drawings was also negatively correlated ($r = -.26$, $p < .05$) with subsequent intrinsic interest in the target materials in the classroom. Concomitantly, rated picture quality was positively correlated ($r = .35$, $p < .01$) with the classroom measure of subsequent intrinsic interest.

Table 2

Mean Number and Quality of Pictures Drawn by Subjects

During Experimental Sessions, Experiment 1.

Experimental Condition	Number of Pictures	Quality of Pictures[a]
Expected Award (n = 30)	2.07[b]	2.84[c]
Did not Expect Award (n = 41)	1.61[b]	3.37[c]

a Higher numbers indicate higher quality pictures

b t = 1.95, df = 69, $p < .06$

c t = 2.29, df = 69, $p < .03$

EXPERIMENT II

The results of Experiment I, combined with the previous data of Lepper et al. (1973), suggested that the overjustification effect represented a relatively replicable and robust phenomenon. Experiment II was designed to extend and refine these findings further, with two primary purposes. First, Experiment II was designed to replicate earlier results with an experimental activity, an extrinsic reward, and a procedure as different as possible from the previous studies. Such a conceptual, rather than procedural, replication seemed necessary to demonstrate the generality of this effect and its independence from the particulars of earlier studies. Second, Experiment II was designed to examine the effects of providing subjects with choice concerning the activity for which they were to be rewarded. Although the self-perception account is not precise on this point, it seemed plausible that the overjustification effect might be dependent upon the child's perception that he had been arbitrarily assigned a task and that if the child were permitted to exercise some measure of choice over the activity he was to engage in, the deleterious effects of expected rewards on subsequent intrinsic interest in the activity would be diminished.

To accomplish these aims, Experiment II involved a 2x2 factorial design, in which Reward Expectancy (Expected—Unexpected) and Choice of Activity (Choice—No Choice) were manipulated orthogonally. Briefly, nursery school children were asked to engage in a novel puzzle-solving task in individual experimental sessions. In the Expected Reward conditions, subjects were first shown an array of attractive toys and were told that they could win a chance to play with these toys if they would first work on the puzzles; in the Unexpected Reward conditions, these toys were not mentioned to subjects until they had finished with the puzzles. Within each of these conditions, half of the subjects were allowed to choose which four puzzles to do, others were assigned four puzzles by the experimenter. After the subjects had finished the puzzles, all subjects were given the same feedback and the same opportunity to play with the attractive toys. Two weeks after these initial sessions, these puzzles were placed out in the children's classrooms by their teachers and the children's interest in this activity in the classroom setting was unobtrusively observed and recorded.

METHOD

Subjects and Experimental Setting.

The subjects for this study were 34 preschool children, ranging in age from 4-1 to 5-2, selected from the student population of the Bing Nursery School on the Stanford University campus. The sample included 16 males and 18 females, from predominantly middle-class backgrounds. An additional five subjects were absent during the entire posttesting period and were therefore lost from the experiment and one subject was discarded from the study because of his inability to solve the puzzles presented during the experimental sessions. As in previous studies, the Bing Nursery School and its associated research facilities served as the setting for this study, and dependent measures of children's subsequent interest in the experimental activities were obtained unobtrusively in the children's preschool classrooms.

Experimental Materials.

To enhance the generality of previous findings and to provide a task consisting of a variety of relatively equivalent but distinct activities, Experiment 2 employed a new experimental activity. This task consisted of a set of puzzles, each consisting of a 3x3 matrix surrounded by a 1" frame, and a set of color cubes -- 1" wooden cubes painted with different colors on each face -- which could be placed over the nine squares of the matrix within the frame to form a puzzle. Each of the nine squares of the puzzle pattern was colored with one of the colors represented on each color cube, and "solving" the puzzle involved placing the appropriately colored side of each color cube on top of each square in the puzzle pattern. With these materials, it was possible to create a wide variety of different but similar designs, and a set of sixteen distinct patterns were used in the study. During the experimental sessions, subjects were presented with eight of these designs; in the postexperimental classroom measures all sixteen designs were presented.

Similarly, to explore further the generality of earlier results, and to insure that the extrinsic incentive would be attractive to all subjects, Experiment 2 employed a different reward from previous studies. Instead of a symbolic "Good Player Award", this study utilized a "Premack" procedure (e.g. Premack, 1965) in which the opportunity to play with any of a set of attractive toys (e.g. a set of chimes, marionettes, a pinball game, a mechanical dog, a toy jeep, two fighting robots, etc.) served as the extrinsic reward.

Experimental Sessions.

For the experimental sessions, each child in the study was escorted individually to one of the research rooms attached to the nursery school by an adult experimenter. Along one wall of the room were two child-sized tables containing the assortment of toys which served as the extrinsic reward. These tables and the toys were hidden from the child's view by two standing 6' opaque wooden screens placed along that wall in front of these tables. In plain view on the other side of the room was a child-sized table containing a tray full of color cubes and a set of eight puzzle patterns. Behind this table was a 2'x3' bulletin board containing representations drawn on 3x5" cards of the eight puzzle patterns.

As the subjects entered the room, the manipulation of Reward Expectancy took place. In the Expected Reward conditions, Experimenter 1 pulled back the wooden screen, exposing the assortment of toys, and asked the subject if he would like a chance to play with them. When the subject assented, the Experimenter 1 then explained to him that he would be able to earn an opportunity to play with these toys if he did a good job on the puzzles sitting at the other table. If he worked hard, the subject was told, and solved the puzzles as quickly as he could he would win a chance to play with these toys. The wooden screen was then replaced, removing the toys from view. In the Unexpected Reward conditions, the toys were not exposed or mentioned.

The subject was then seated at the table containing the puzzles and the manipulation of Choice of Activity was administered. In the Choice conditions, the subject was shown the eight puzzles displayed on the bulletin board behind the table and was asked to select four of these puzzles which he would like to work on. In the No Choice conditions, the subject was assigned the four puzzles by Experimenter 1. In both cases, if the subject was in an Expected Reward condition, Experimenter 1 indicated that if the subject worked hard on the puzzles and solved them quickly he would be able to win a chance to play with the toys.

At this point Experimenter 1 mentioned to the subject that another person, Experimenter 2, would like to watch him solve the puzzles while he (Experimenter 1) finished some other work he had to do. Experimenter 2 then entered the room, and was introduced to the subject; and Experimenter 1 left. Experimenter 2, who conducted the remainder of the experimental session was therefore blind to the subjects's experimental condition.

Experimenter 2 then showed the subject how the color cubes could be used to solve the puzzles and helped the subject, if necessary, to complete a small practice puzzle. The subject was then asked to solve the four puzzles which he had been assigned or had chosen. As the subject was working on the puzzles Experimenter 2 attempted to appear interested, but not overly responsive, to the subject; and an observer behind a one-way mirror along one side of the room recorded the amount of time the subject took to complete each puzzle and any comments the subject made during the session.

When the child had finished the last puzzle, Experimenter 2 congratulated him for having done a fine job on the puzzles and informed all subjects that he had some toys behind the wooden screen across the room that the subject might now play with. The child was allowed ten minutes to play with the toys of his choice, at which point Experimenter 1 returned to take the subject back to his classroom.

Classroom Observations.

Two weeks after the completion of these individual experimental sessions, the primary measure of subsequent intrinsic interest in the activity, in the absence of any expectation of extrinsic reward, was taken in the subjects' classrooms following the procedure established in previous studies. For the first hour of three consecutive class sessions, the experimental activity was set out by the classroom teachers, among the other periodic activities chosen by the teachers for each day, at a table near the door to the classroom, so that when the materials were presented, the children were free to choose between the target activity and the variety of other indoor and outdoor activities offered by the nursery school. The puzzles set out in the classroom included the eight puzzles the children had seen in the experimental room plus eight additional similar puzzles the children had not seen before. During this period, two observers, each blind to the subjects' experimental conditions and each equipped with an 8-track Rustrak continuous miltiple event recorder, recorded the total amount of time spent at the target table for each of the children in the classroom. Although it was not possible to record reliably the amount of time spent on each particular puzzle, records were also kept of which puzzles were completed by each subject.

RESULTS

Preliminary analysis of the data indicated no interaction of sex of child with experimental condition, and the data were therefore collapsed across this dimension for further analysis. Similarly, as in previous studies, a log transformation ($Y' = \ln (Y=1)$) was performed on the percentage of time data from the classroom to produce homogenous treatment variances.

Table 3 presents these primary data, which were submitted to a 2x2 least-squares analysis of variance, again with quite clear results. As in both of the previous studies, subjects in the Expected Reward conditions showed significantly less subsequent interest in the experimental activity in their classrooms than did subjects in the Unexpected Reward conditions ($F_{1,30} = 4.76$, $p < .05$). Neither the Choice variable nor the interaction of Choice with Reward Expectancy, however, approached significance (both F's < 1). Additional analyses on the number of puzzles completed by subjects and the number of "new" vs "old" puzzles yielded no significant differences among treatment conditions, although it should perhaps be noted that these measures seemed a very crude indicator of relative preference for different puzzles, since any particular subject's choice was often limited by the behavior of others who happened to be seated at the table at the same time.

Table 3

Transformed Percentage of Classroom Time Spent with the Target Activity, by Treatment Condition, Experiment 2.

Reward Expectancy	Choice of Activity	
	Choice	No Choice
Expected Reward	.68	1.07
Unexpected Reward	1.85	1.65

EXPERIMENT III

An essential concomitant to the systematic use of extrinsic rewards to control a person's behavior is the use of surveillance — the constant or periodic monitoring of that person's behavior by another with authority or power over him. If rewards are to be made contingent upon performance, some means must be available for the rewarding agent to determine whether performance standards have been attained. Surveillance by the person administering rewards allows for such a continuing evaluation of performance on which rewards are to be based and it is not surprising therefore, that surveillance is a common characteristic of schools (Silberman, 1970), and other custodial institutions (Goffman, 1961).

From the perspective of self-perception theory, the effects of surveillance on subsequent behavior outside the immediate situation in which surveillance occurs should parallel the effects of expected extrinsic rewards. Both should serve to convince the person faced with these pressures, as well as others observing him, that his behavior is governed by external forces and constraints in the situation rather than by any intrinsic motives or interests. Indeed substantial evidence (Strickland, 1958; Kruglanski, 1970; Kipnis, 1972) already exists demonstrating that "supervisors" forced to monitor frequently a "subordinate's" work will come to distrust that person's motivations and will subsequently be likely to continue to monitor that person's performance frequently. Self-perception theory suggests that an analagous effect should occur in the "subordinate" himself, so that if this person is subsequently presented with the same activity in the absence of surveillance, he will be less likely to choose to engage in that activity.

Experiment III was designed to examine the joint effects of expectation of extrinsic rewards and adult surveillance on children's subsequent intrinsic interest in an activity. To these ends, Surveillance (High-Low-No) and Expectation of Reward (Expected-Unexpected) were manipulated orthogonally in a 3x2 design. Preschool children were asked to engage in a novel activity in individual sessions. In the Expected Reward conditions, subjects expected to be able to win a chance to play with a highly attractive set of toys by engaging in the activity; while in the Unexpected Reward conditions, subjects had no knowledge of these toys until they were finished with the activity. All subjects were asked to undertake the activity in the experimenter's absence. Orthogonal to the manipulation of Reward Expectancy, subjects in the Surveillance conditions were told that the experimenter would be monitoring their performance during the session either most of the time (High Surveillance) or only occasionally (Low Surveillance), while subjects in the Non-surveillance conditions were given no such expectation. From a self-perception perspective, it was predicted that both surveillance and the expectation of an extrinsic reward would decrease the amount of interest children would show in the activity later, in their classrooms, where extrinsic pressures were absent.

METHOD

Subjects and Experimental Setting.

The subjects for this study were 80 preschool children, ranging in age from 4-0 to 5-3, selected from the student population at the Bing Nursery School, located on the Stanford University campus. These children came from predominantly

white, middle-class backgrounds, and the sample included 39 males and 41 females. As in previous studies, the Bing Nursery School and its associated facilties served as the setting for this study, allowing the introduction of a novel experimental activity into the ongoing nursery school program by the nursery school teachers, without intrusion into the classroom by researchers.

Experimental Materials.

To assess the generality of the findings of previous studies and to provide an activity with explicit performance criteria, Experiment 3 employed a new experimental task. This activity consisted of a set of 20 puzzles, each consisting of 10"x10"x1/2" board with 1/4" insets cut to accomodate multicolored plastic puzzle pieces in various geometric shapes. For purposes of introduction into the classroom, this activity seemed to have both sufficient attractiveness to be of initial intrinsic interest to most children and sufficient similarity to other normal classroom activities so as not to appear strange in the classroom setting. Of this set of 20 puzzles, a single set of ten was selected for use during the experimental sessions by all subjects, while the remaining puzzles were used only in the classroom. On each day the puzzles were set out in the classroom, five puzzles from the experimental sessions and five puzzles not appearing in the experimental room were selected randomly for presentation.

As in the second study, to insure that at least some of the available toys would provide a strong incentive for each of the subjects, Experiment 3 also employed a "Premack" procedure in which the opportunity to play with a collection of highly attractive toys (e.g., a miniature garage and gas station, racing cars, a toy dog, a lunar lander and robot, a doll, etc.) served as the extrinsic incentive.

Finally, in order to study surveillance per se, in the absence of any concurrent feedback to the child concerning his performance or interaction between the subject and the experimenter, this study employed a television camera, through which the child could be told that he was being observed. For this purpose a GE television camera, mounted on a moveable metal tripod and fitted with a Zeiss zoom lens was used. This procedure, in addition to eliminating considerable extraneous variance, permitted a clear variation in the amount of time during the experimental sessions that the subject believed he was actually under surveillance.

Experimental Sessions.

For the experimental session, each child was escorted individually to one of the research rooms attached to the nursery school by an adult experimenter. In the experimental room were two long child-sized tables, each holding a set of puzzles, and a television camera mounted on a moveable metal tripod placed next to one of the tables. In addition, in the corner of the room by the entrance, were the set of attractive toys, hidden from sight by a cloth screen.

As the subjects entered the room, the manipulation of Reward Expectancy took place. In the Expected Reward conditions, the experimenter pulled back the cloth screen, exposing the assortment of toys, and asked the subject if he would like a chance to play with them. When the subject assented, the experimenter then explained to him that he would be able to earn an opportunity to play with these toys

if he did a good job on the puzzles, working hard on them and solving them as quickly as he could. The cloth curtain was then replaced. In the Unexpected Reward conditions, the toys were not exposed or mentioned.

The subject was then seated at a first table which contained four practice puzzles of increasing difficulty, included to establish for the child a procedure for the remaining puzzles. The experimenter demonstrated to the subject how to solve the first puzzle and then gave the subject a chance to solve the remaining three puzzles. When the four puzzles had been completed, the child was asked to spread them out on the table and to ring a small bell on the corner of the table as a signal that he had finished the puzzles.

When the child had finished, he was asked to move to a second table next to the television camera. This second table contained the six puzzles comprising the actual experimental task and, again, a small bell. The experimenter indicated to all subjects that they were to work hard on the puzzles and to solve the puzzles as fast as they could In the Expected Reward conditions the experimenter also indicated that how fast the subject did the puzzles and how hard he worked would determine how much time he would be given to play with the toys he had been shown.

In the Surveillance conditions, the television camera beside the table was equipped with a zoom lens pointed directly at the table where the subject would be working, and on the table directly in front of the subject was a small light. After the child had been told that the experimenter would be leaving the room, the experimenter explained to the child that he would still be able to see how well the child was doing on the puzzles, from time to time, through the nearby television camera. At this point, the experimenter pointed out the camera to the child and explained that the child would be able to tell when he was being watched, because whenever he was being watched, the small light on the table in front of him would come on. In the Non-surveillance conditions, the television camera was turned to face away from tha table, the lens was removed from the camera, and the small light was removed from the table. No mention was made of the camera or surveillance by the experimenter. All subjects were told, however, that when they finished the puzzles they were to lay them out on the table and to ring the bell, as they had done with the practice puzzles, to indicate that they had finished them.

Before leaving the room, the experimenter then reinstated the critical elements of procedure for each subject, then exited, leaving the subject alone. As the subject worked on the puzzles, within the Surveillance conditions, the amount of surveillance was manipulated by an observer watching the experimental session from behind a one-way mirror. In the Low Surveillance conditions, the light signalling the subject that he was being watched by the experimenter was turned on while the subject was working on one of the six puzzles; in the High Surveillance conditions, the light was turned on during four of the six puzzles. In both cases, the choice of puzzles to be undertaken under surveillance was randomly determined. In addition, this observer recorded the amount of time the subject took to solve each puzzle and any comments the child made during the session.

After the subject had completed the six puzzles, the experimenter re-entered the room, and indicated to all subjects that they had done a very good job of solving

the puzzles quickly. In the Expected Reward conditions, the experimenter added that because the subject had done such a good job he had earned the chance to play with the toy collection; in the Unexpected Reward conditions, the experimenter added simply that he also had a collection of toys the subject could not play with. All subjects were then given ten minutes to play with their choice of toys. At the end of this period, the subjects were thanked and returned to their classrooms by the experimenter.

Classroom Observations.

One to two weeks after the completion of these individual experimental sessions, the primary measure of subsequent intrinsic interest in the activity, in the absence of any expectation of extrinsic reward, was taken in the subjects' classrooms following the procedure established in previous studies. For the first hour of three consecutive class sessions, the experimental activity was set out by the classroom teachers, among the other periodic activities chosen by the teachers for each day, at a table near the door to the classroom, so that when the materials were presented, the children were free to choose between the target activity and the variety of other indoor and outdoor activities offered by the nursery school. During this period, two observers, each blind to the subjects' experimental conditions and each equipped with an 8-track Rustrak continuous multiple event recorder, recorded the total amount of time spent at the target table for each of the children in the classroom.

RESULTS

Preliminary analyses indicated no significant effect of sex of child or interaction of sex with experimental conditions; hence data were collapsed across this dimension for further analysis. Preliminary analyses also revealed no significant differences between the High Surveillance and Low Surveillance conditions on any measure; and these two treatments were therefore collapsed into a single condition for purposes of analysis, yielding a 2x2 factorial design (Expected-Unexpected Reward x Surveillance-Nonsurveillance).

Table 4 presents the data of primary interest in this study — the proportion of subjects in each condition who showed an interest in the experimental activity in the classroom setting.[2] These proportions were transformed to arcsines, and a 2x2 analysis of variance was performed on these data (cf. Langer & Abelson, 1972), yielding significant main effects of both Reward Expectancy ($F = 4.86$, $df = 1/00$, $p < .05$) and Surveillance ($F = 4.86$, $df = 1/00$, $p < .05$, but no interaction between these two variables ($F < 1$). Thus, as in the previous studies, expectation and receipt of an extrinsic reward for engaging in an activity produced decreased intrinsic interest in the activity in the classroom setting; and, orthogonal to this effect, surveillance by the experimenter during the task produced an additional decrease in later interest in the activity.

Similarly, a 2x2 analysis of variance was also performed on the amount of time each subject required to solve the six puzzles during the experimental session. This analysis yielded a marginally significant effect of Reward Expectancy ($F = 3.08$, $df = 1/76$, $p < .10$), with subjects expecting to receive a reward tending to solve the puzzles more quickly than subjects not expecting a reward, but no significant effect of Surveillance ($F < 1$) or interaction of Surveillance with Reward Expectancy ($F = 1.26$) on puzzle speed.

Table 4

Percentage of Subjects Subsequently Playing with the Target Materials in the Classroom, Experiment 3.

Reward Expectancy	Surveillance Exercised	
	Surveillance	Nonsurveillance
Expected Reward	50%	70%
Unexpected Reward	70%	92%

DISCUSSION AND CONCLUSIONS

Taken together, the findings of these three experiments provide strong evidence of the potentially deleterious effects of expected extrinsic rewards on children's subsequent intrinsic motivation. In each of these studies, as in the experiment by Lepper, Greene, & Nisbett (1973), children led to expect and subsequently given an extrinsic reward for engaging in an activity of initial interest exhibited significantly less later interest in that activity in the classroom situation where extrinsic rewards were not available. The persistence of this effect in the face of numerous variations in the reward, activity, and procedure employed, moreover, suggests that this overjustification phenomenon may have considerable generality. In addition, the results of Experiment 3 further indicate that surveillance, a common concomitant of extrinsic incentive systems, may also serve to undermine intrinsic interest in activities undertaken under surveillance.

The potential implications of these studies seem considerable for schools and other institutions in which systems of extrinsic incentives and periodic surveillance are employed to control and manipulate behavior. To the extent, for example, that many of the activities children are asked to attempt in school may be of initial intrinsic interest to at least some of the children, the effect of presenting these activities in the context of a system of extrinsic incentives and adult surveillance may be to undermine that intrinsic interest in those activities. Unwittingly, these studies suggest, we may often turn activities of initial interest into drudgery which children will engage in only when external pressures are present to force or lure them to do so — a suggestion which is higly congruent with the observations of a number of analysts of our current educational system.

Indeed, from Dewey (1900) and Whitehead (1929) to Holt (1964) and Silberman (1970), it has often been suggested that a central problem with traditional compulsory education is its inability to preserve the intrinsic interest in learning and exploration that the child seems to possess when he first enters school. Instead, these authors suggest, the process of schooling seems to undermine subtly children's spontaneous interest in the process of learning itself.

It may be objected, of course, that many activities presented to children in school are of little or no intrinsic interest to the children and that there are many important activities in which children would not engage spontaneously without external pressure or offer of external reward. Certainly this is true and certainly in many cases the use of extrinsic rewards to maintain and control children's behavior will be both necessary and appropriate. Obviously the "lesson" to be learned from the present studies is not that extrinsic rewards should be abandoned, but rather that if one wishes to foster an interest in activities which will manifest itself in situations or at times when extrinsic pressures are absent, one would be well advised to employ the minimal amount of pressure sufficient to elicit or maintain the desired behavior.[3]

Interestingly, similar conclusions seem to have emerged recently within the growing literature on the use of "token economy" programs — in which children are paid with tokens, subsequently redeemable for attractive rewards, for exhibiting desired behavior patterns — in the modification, and control, of children's classroom behavior (cf. O'Leary & O'Leary, 1972). Although such token economies historically have been remarkably successful at producing control over children's behavior in the particular situation in which the token system is operative, such programs have been notably less successful at producing generalization of behavior change to other situations where rewards are not present (O'Leary & Drabman, 1971;

Kazdin & Bootzin, 1972; Meichenbaum, Bowers, & Ross, 1968). From a self-perception perspective, it is encouraging to note the recent suggestions by astute proponents of token programs that it seems advisable (a) to use powerful token programs only when necessary (O'Leary, Poulus, & Devine, 1971) and (b) if necessary, to employ minimally sufficient incentives consistent with maintenance of consistent with maintenance of control over the target behavior (O'Leary, Drabman, & Kass, 1973).

Nearly 100 years ago, Mark Twain (1875) offered the following observation on human nature:

> If he (Tom Sawyer) had been a great and wise philosopher, like the writer of this book, he would have now comprehended that Work consists of whatever a body is obliged to do and that Play consists of whatever a body is not obliged to do. And this would help him to understand why constructing artificial flowers or performing on a treadmill is work, while rolling tenpins or climbing Mont Blanc is only amusement. There are wealthy gentlemen in England who drive four-horse passenger coaches twenty or thirty miles on a daily line, in the summer, because the privilege costs them considerable money; but if they were offered wages for the service that would turn it into work and then they would resign. [p. 16]

The present studies suggest that the implications of this distinction have not been lost on children a century later.

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FOOTNOTES

1. All p values reported in this paper are based on two-tailed tests of significance.

2. A nonparametric analysis is presented in Experiment 3, because in contrast to the earlier studies, the materials in this experiment appeared functionally "exhaustible", in the sense that once a child had solved a particular puzzle, its immediate appeal was greatly reduced, while in earlier studies the materials allowed each child to work at his own level for virtually unlimited amounts of time. Hence, in this study, the amount of time children actually spent with the activity seemed to be influenced as much by the number of other children at the table "tying up" puzzles, the child's skill in solving puzzles, or his motivation to solve the puzzles quickly as by his interest in the activity.

3. A self-perception account suggests, however, that one should be cautious in informing that intrinsic interest in an activity is lacking, since any observer's estimate of the inherent interest value an activity has for an actor may well be colored by the setting in which he observes the actor engaging in the activity. If we, like the supervisors in the Strickland (1958) study, observe a child engaging in an activity when extrinsic pressures are great, we will attribute his behavior to the external contingencies in the situation. In fact, if the self-perception account is correct, it would suggest that the use of overly sufficient pressure to induce a person to engage in an activity may produce a self-sustaining and self-fulfilling cycle since both the source and the recipient of that pressure will be subject to the same attributional "bias". Thus, a teacher may come to believe that the child is motivated only by external pressures and will therefore maintain that external pressure, while the maintenance of that pressure in and of itself may ultimately convince the child that indeed he is motivated only by the external pressure, making him less likely to engage in the activity in the later absence of that pressure. Certainly such self-fulfilling cycles at least deserve further attention.